

*Serial No. 9/754,355  
Docket No. 0630-1213P  
Substitute Specification*

## CHANNEL SWITCHING APPARATUS OF DIGITAL TELEVISION AND METHOD THEREOF

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

**[0001]** The present invention relates to a channel switching apparatus of a digital television and a method thereof, and in particular to a channel switching apparatus of a digital television and a method thereof which are capable of making identification of a channel easier by providing OSD information related to a channel to be switched to a user when the user switches the channel of the digital television up/down.

#### 2. Description of the Prior Art

**[0002]** According to a start of a digital broadcasting, a plurality of forms of a reception apparatus for a digital television such as a direct view DTV receiving the digital broadcasting, a DTV set-top box etc. are developed, and are sold.

**[0003]** In general, in order to select a pertinent channel among a plurality of broadcast signals received to the digital television, PAT/PMT information or PSIP information is required, in order to display the select channel on a screen. The received digital broadcast signal is switched into a digital channel and is displayed on the screen. A good amount of time is required in order to display the digital broadcast signal on the screen.

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**[0004]** An estimated required time for the display after the digital switching will now be described as below.

**[0005]** First, about 300 ~ 400ms time is required for tuning and channel demodulation of a received digital broadcast signal.

**[0006]** In order to select a channel of the digital television, about 400 ~ 500ms time for searching a PID (Packet ID) comprised in the digital broadcast signal with each mode is required.

**[0007]** There are two modes for the digital television. A PAT/PMT mode requires about 400ms time in order to search the PID, and a PSIP mode requires about 500ms time in order to search the PID.

**[0008]** For outputting the received digital broadcast signal as a perfect picture after transmitting it to a video decoder, maximum 728ms are required because of 500ms time for receiving an I picture and VBV delay.

**[0009]** After switching the digital broadcast signal into a digital channel, 100ms of coding time is more required besides the maximum 728ms for displaying a perfect picture.

**[0010]** In the PAT/PMT mode, the total required time for displaying a picture can be described as below Equation 1.

[Equation 1]

$$400\text{ms} + 500\text{ms} + 500\text{ms} + 730\text{ms} + 100\text{ms} = 2230\text{ms}$$

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**[0011]** In the PSIP mode, the total required time for displaying a picture can be described as below Equation 2.

**[Equation 2]**

**[0012]**  $400\text{ms}+400\text{ms}+500\text{ms}+730\text{ms}+100\text{ms}=2130\text{ms}$

In order to display the channel selected among the broadcast signals received by the digital television, about 2230ms time is required in the PAT/PMT mode, and about 2130ms time is required in the PSIP mode.

**[0013]** As described above, in the digital television, about 2 or 3 seconds are required in order to display the select channel on a screen. But this may cause unpleasantness and discomfort to a user by requiring some to select a request channel because each channel can display a received picture after displaying a black picture for 2 or 3 seconds. The above-mentioned problem is decreased according to the development of a hardware technology. However, instant channel switching is not improved, and accordingly it still causes discomfort to the user.

**[0014]** In addition, in order to select the pertinent channel among the digital broadcast signals in the digital television, the PAT information, PMT information and PSIP information are required.

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## SUMMARY OF THE INVENTION

**[0015]** An object of the present invention is to provide a channel switching apparatus of a digital television and a method thereof which are capable of making an identification of a select channel easier by displaying a preset channel icon through an OSD before displaying the select channel on a screen in channel up/down of the digital television.

**[0016]** Another object of the present invention is to provide a channel switching apparatus and method for a digital television, which overcome the limitations and disadvantages of the related art.

**[0017]** In order to achieve the above-mentioned and other objects, the channel switching apparatus of the digital television in accordance with an embodiment of the present invention comprises a signal processing unit for receiving a broadcast signal, performing a digital signal processing and outputting it, a CPU for searching a pertinent icon by accessing a storing unit storing channel icons corresponding to the channels of the digital broadcast signal outputted of the selected channel from the signal processing unit, an icon display unit for displaying the channel icon searched from the CPU on a screen, and the storing unit for storing each designated channel icon corresponding to each received broadcast channel.

**[0018]** The channel switching method of the digital television in accordance with the present invention comprises an inputting process for inputting an up/down key of a channel, a searching process for searching the channel selected by the up/down

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key of the channel, a searching process for searching a channel icon corresponding to the searched channel, and a displaying process for displaying the channel icon corresponding to the searched channel on the screen for the receiving the broadcast signal.

**[0019]** These and other objects of the present application will become more readily apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

#### BRIEF DESCRIPTION OF THE DRAWING

**[0020]** The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

**[0021]** FIG.1 is a construction profile illustrating a channel switching apparatus of a digital television in accordance with the present invention.

**[0022]** FIG.2 is a flow chart illustrating a channel switching apparatus of a digital television in accordance with the present invention.

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## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0023]** A channel switching apparatus of a digital television and a method thereof in accordance with the present invention will now be described with reference to accompanying drawings.

**[0024]** FIG.1 is a construction profile illustrating a channel switching apparatus of a digital television in accordance with an embodiment of the present invention. It comprises a signal processing unit 100 for receiving a broadcast signal, performing a digital signal processing and outputting it, a CPU 200 for detecting a pertinent icon by accessing a storing unit 400 storing channel icons corresponding to the channels of the digital broadcast signal outputted from the signal processing unit 100, an icon display unit 300 for displaying the channel icon of the selected channel outputted from the CPU 200 on a screen, and the storing unit 400 for storing each designated channel icon corresponding to each received broadcast channel.

**[0025]** The signal processing unit 100 comprises a digital signal processor unit 110 for processing the received broadcast signal into a digital signal and outputting it, and an analog signal processor unit 120 for processing the received broadcast signal into an analog signal.

**[0026]** The storing unit 400 stores program data, and sets a diagram or a character representing a broadcasting station in each received broadcast signal as a channel icon corresponding to the channel. The storing unit 400 comprises a main memory unit 410 for storing in a lookup table format the channel icons of the channels,

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each icon being set by using a certain diagram or character in accordance with the received broadcast signal by the user and corresponding to a particular channel, and an auxiliary storage unit 420 for storing data for operating a program.

[0027] The operation of the apparatus will now be described in more detail with reference to accompanying FIG.2.

[0028] First, when a power is applied, the CPU 200 receives program data of the whole system from the main memory unit 410, and judges whether the channel up/down key (or channel number key) of the digital television is inputted. The data for operating the program of the main memory unit 410 is inputted from the auxiliary storage unit 420.

[0029] When the channel up/down key is inputted (S1), the CPU 200 searches the pertinent channel (selected channel) (S2), receives a broadcast signal corresponding to the searched channel from the signal processing unit 100, and searches for an icon of the pertinent channel by comparing the pertinent channel information with channel numbers and icons stored in the main memory unit 410 (S3).

[0030] The channel icon corresponding to the pertinent channel obtained from the main memory unit 410 is then displayed on a screen after passing the icon display unit 300 (S4), and it is judged whether the channel up/down key (or channel number key) is inputted again (S5).

[0031] When the up/down key for selecting another channel is not inputted (S5), the CPU 200 judges whether processing of the video signal of the currently selected channel corresponding to the signal outputted from the digital signal processor unit